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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MORILLO, JANEL COMBS

ART UNIT	PAPER NUMBER
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1742

DATE MAILED: 04/07/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/783,377

Applicant(s)

SEGAL ET AL.

Examiner

Janelle Combs-Morillo

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 21-28,32-37 and 40-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 21-28,32-37 and 40-46 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 01 12 04. 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 21, 22, 32-37, 40-43, 45, and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunlop et al (US 5,809,393 A) in view of Xu et al. (US 6,451,179).

Dunlop teaches (col. 4 lines 28-33) sputtering targets comprising aluminum and up to 10wt% of Cu, Si, Zr, Ti, W, Pt, Au, Nb, Ru, Sc, Co, Mo, Hf, and mixtures thereof. This range includes applicant's claimed range of 1000ppm or less, and Dunlop provides examples (col. 8 line 16 and Fig. 3 and 4) or additions as low as 0.5 wt%, which is approximate to that of applicant's claimed invention. Dunlop et al. also teaches (col. 4 lines 16-21) grain sizes of less than 20 microns for aluminum sputtering targets. With regard to the amended dopant markush group of Ac, As, B, Ba, Bi, C, Ca Cd, etc. the examiner points out that the instant range of these elements is held to "less than or equal to 1000 ppm". Dunlop does not teach any (and therefore held to teach substantially zero) of the amended dopant markush group elements of Ac, As, B, Ba, etc. are present in his fine grained aluminum sputtering target. Substantially zero meets the instant limitation of "less than or equal to 1000 ppm".

Overlapping ranges have been held to be a prima facie case of obviousness, see MPEP § 2144.05. It would have been obvious to one of ordinary skill in the art to select any portion of the

Art Unit: 1742

range, including the claimed range, from the broader range disclosed in the prior art, because the prior art finds that said composition in the entire disclosed range has a suitable utility.

Concerning the process step of casting recited in instant claim 32, it is well settled that a product-by-process claim defines a product, and that when the prior art discloses a product substantially the same as that being claimed, differing only in the manner by which it is made, the burden falls to applicant to show that any process steps associated therewith result in a product materially different from that disclosed in the prior art. See MPEP 2113, *In re Brown* (173 USPQ 685) and *In re Fessman* (180 USPQ 524) *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985).

With regards to claims 21, 35, 41, and 43, wherein the aluminum has a purity of at least 99.999at%, Dunlop does not specify the purity of the aluminum used in the sputtering targets. However, purer forms of known products may be patentable, but the mere purity of a product, by itself, does not render the product unobvious. *Ex parte Gray*, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989).

Additionally, Xu et al teaches (claim 8, col. 2 lines 55-62) using 99.999% pure aluminum in sputtering targets, and teaches that using aluminum of such purity is useful for preventing the dewetting layer, which improves coverage of the sputtered layer and reduces the formation of voids in the overlayer.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use aluminum of 99.999% purity as taught by Xu et al in the sputtering target of Dunlop et al in order to prevent dewetting of the wetting layer, improve coverage of the sputtered layer, and reduce the formation of voids in the overlayer.

Art Unit: 1742

Concerning claim 34, which recites the target is monolithic, Dunlop et al shows (Figs. 6-8) a process wherein a monolithic target is worked. The disclosure of Dunlop et al. is primarily directed towards the production of monolithic targets.

Concerning claim 35, wherein the target is made by a process including ECAE, Dunlop teaches (col. 3 lines 39-51) creating sputtering targets using ECAE.

Concerning claim 33, Dunlop does not teach making the sputtering target having a size $\geq 890 \times 910 \times 19 \text{ mm}^3$. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a sputtering target of the size necessary for its intended use. Change in size is insufficient to distinguish the claimed invention from the prior art. See *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955), MPEP 2144.04 IV. Also, there is no suggestion in Dunlop et al that the prior art disclosure would not be functional for any sputtering target size.

Concerning dependent claims 45 and 46, Dunlop is held to meet the limitation of “less than or equal to 1000 ppm of elements... at least one of the elements being selected from... Be... Ge”, because though Dunlop does not teach the presence of Be or Ge, Dunlop is held to meet the instant limitation of “less than or equal to 1000 ppm” of said elements.

3. Claims 23-28 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunlop and Xu alone, or in view of Takashima (US 2002/0014406 A1), as applied to claims above.

As stated above, Dunlop and Xu teach a sputtering target processed substantially as claimed and with a substantially overlapping alloy composition and grain size. Because of the broad overlap, and because applicant has not shown specific unexpected results with regard to

Art Unit: 1742

the instant alloying ranges, it is held that Dunlop and Xu have created a prima facie case of obviousness of the presently claimed invention. Overlapping ranges have been held to be a prima facie case of obviousness, see MPEP § 2144.05, *In re Best* 195 USPQ 430, *In re Malagari*, 182 USPQ 549, *In re Titanium Metals Corporation of America v. Banner*, 227 USPQ 773 (Fed. Cir 1985), *In re Woodruff*, 16 USPQ 2d 1934, and *In re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976).

Alternatively, the examiner points out that Takashima teaches (see paragraph [0042] and claim 1) an Al-based target material comprising substantially pure Al and 0.01-10at% of at least one intermetallic compound forming element (such as Sc, Ti, Hf, etc.), which overlaps the presently claimed alloying ranges, in order to prevent hillock formation see [0043]. It would have been obvious to one of ordinary skill in the art to use a low alloying amount of an intermetallic compound forming element (such as Sc, Ti, Hf, etc.), as taught by Takashima, for the (broad) aluminum sputtering target taught by the combination of Dunlop and Xu, in order to prevent hillock formation (see Takashima at [0043]).

4. Claims 21-28, 32-37, and 40-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dunlop et al (US 5,809,393 A) in view of Ueda et al (US 5,541,007).

As stated above, Dunlop teaches (col. 4 lines 28-33) sputtering targets comprising aluminum and up to 10wt% of Cu, Si, Zr, Ti, W, Pt, Au, Nb, Ru, Sc, Co, Mo, Hf, and mixtures thereof, which broadly overlaps the presently claimed alloying ranges. This range includes applicant's claimed range of 1000ppm or less, and Dunlop provides examples (col. 8 line 16 and Fig. 3 and 4) or additions as low as 0.5 wt%, which is approximate to that of applicant's claimed invention. Dunlop et al. also teaches (col. 4 lines 16-21) grain sizes of less than 20 microns for

Art Unit: 1742

aluminum sputtering targets, which overlaps or is a close approximation of the presently claimed grain size range. With regard to the amended dopant markush group of Ac, As, B, Ba, Bi, C, Ca Cd, etc. the examiner points out that the instant range of these elements is held to “less than or equal to 1000 ppm”. Dunlop does not teach any (and therefore held to teach substantially zero) of the amended dopant markush group elements of Ac, As, B, Ba, etc. are present in his fine grained aluminum sputtering target. Substantially zero meets the instant limitation of “less than or equal to 1000 ppm”.

Overlapping ranges have been held to be a prima facie case of obviousness, see MPEP § 2144.05. It would have been obvious to one of ordinary skill in the art to select any portion of the range, including the claimed range, from the broader range disclosed in the prior art, because the prior art finds that said composition in the entire disclosed range has a suitable utility.

Concerning the process step of casting recited in instant claim 32, applicant has not shown that the instant product materially different from that disclosed in the prior art (see above discussion). See MPEP 2113.

With regards to claims 21, 35, 41, and 43, wherein the aluminum has a purity of at least 99.999at%, Dunlop does not specify the purity of the aluminum used in the sputtering targets. However, purer forms of known products may be patentable, but the mere purity of a product, by itself, does not render the product unobvious. Ex parte Gray, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989).

Additionally, Ueda et al teaches (col. 2 lines 55-62) using > 99.99% pure aluminum in sputtering targets (such as 99.999% column 5 line 1), and teaches that using aluminum of such

Art Unit: 1742

purity is useful for creating sputtering targets with low resistivity, good connection properties, and low voids (column 6 lines 1-7).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use aluminum of 99.999% purity as taught by Ueda et al in the sputtering target of Dunlop et al in order to creating sputtering targets with low resistivity, good connection properties, and low voids (column 6 lines 1-7), and because Dunlop teaches a broad range of aluminum alloy compositions can be processed by said method of ECAE.

Concerning claim 34, which recites the target is monolithic, Dunlop et al shows (Figs. 6-8) a process wherein a monolithic target is worked. The disclosure of Dunlop et al. is primarily directed towards the production of monolithic targets.

Concerning claim 35, wherein the target is made by a process including ECAE, Dunlop teaches (col. 3 lines 39-51) creating sputtering targets using ECAE.

Concerning claim 33, Dunlop does not teach making the sputtering target having a size $\geq 890 \times 910 \times 19 \text{ mm}^3$. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a sputtering target of the size necessary for its intended use. Change in size is insufficient to distinguish the claimed invention from the prior art. See *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955), MPEP 2144.04 IV. Also, there is no suggestion in Dunlop et al that the prior art disclosure would not be functional for any sputtering target size.

Concerning claims 23-25 and 44, Ueda teaches an aluminum alloy composition consisting of 100ppm-1wt% Sc balance aluminum (see abstract), which is a close approximation of the presently claimed "less than 100 ppm... Sc". Because Dunlop teaches a broad range of

Art Unit: 1742

aluminum alloy compositions can be processed by said method of ECAE, and because Ueda teaches that said Al-Sc alloy composition is suitable for sputtering targets with low wire breakage (column 2 lines 3-9), it would have been obvious to one of ordinary skill in the art to combine the disclosures of Dunlop and Ueda.

Concerning dependent claims 45 and 46, Dunlop is held to meet the limitation of “less than or equal to 1000 ppm of elements... at least one of the elements being selected from... Be... Ge”, because though Dunlop does not teach the presence of Be or Ge, Dunlop is held to meet the instant limitation of “less than or equal to 1000 ppm” of said elements.

5. Claims 21, 32-34, 40-43, 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Legresy et al (US 5,160,388).

Legresy teaches a high purity (>99.99%, see column 1 lines 58-59) fine grain size (50-80 μm , see column 3 lines 48-49) aluminum alloy sputtering target with 0.05-2% Si balance aluminum (see claim 1). The examiner points out that 0.05% = 500 ppm, which overlaps the alloying ranges in claims 21, 32, 33, 40-43, 45, and 46 of “less than 1000 ppm...Si”. Legresy teaches the importance of high purity aluminum- “obviously the aluminum and silicon must be very pure, namely at least 99.99% and in particular the aluminum must be free from impurities producing alpha radiation” (column 1 lines 58-61). Therefore Legresy teaches motivation to provide high purity aluminum >99.99%, such as 99.999%, etc, which falls within the instant alloying ranges.

With regard to the amended dopant markush group of Ac, As, B, Ba, Bi, C, Ca Cd, etc. the examiner points out that the instant range of these elements is held to “less than or equal to 1000 ppm”. Legresy does not teach any (and therefore held to teach substantially zero) of the

Art Unit: 1742

amended dopant markush group elements of Ac, As, B, Ba, etc. are present in his fine grained aluminum sputtering target. Substantially zero meets the instant limitation of “less than or equal to 1000 ppm”. Therefore, it is held that Legresy overlaps the alloy composition in instant claims 21, 32, 33, 40-43, 45, and 46.

Overlapping ranges have been held to be a prima facie case of obviousness, see MPEP § 2144.05. It would have been obvious to one of ordinary skill in the art to select any portion of the range, including the claimed range, from the broader range disclosed in the prior art, because the prior art finds that said composition in the entire disclosed range has a suitable utility.

Concerning the method step of “casting” recited in instant claims 32 and 40, Legresy teaches casting the billets or disks in column 2 lines 12-25.

Because Legresy teaches a substantially overlapping alloy composition (instant claims 45 and 46), as well as a grain size that falls within the instant range, it is held that Legresy has created a prima facie case of obviousness of the presently claimed invention.

Concerning dependent claim 33, Legresy teaches the diameter of the sputtering target is 250 mm and the thickness is reduced to 25 mm, which fall within the instant size range.

Concerning dependent claim 34, in the example on columns 5-6, Legresy teaches a monolithic sputtering target disk.

Concerning dependent claims 45 and 46, Legresy is held to meet the limitation of “less than or equal to 1000 ppm of elements... at least one of the elements being selected from... Be... Ge”, because though Legresy does not teach the presence of Be or Ge, Legresy is held to meet the instant limitation of “less than or equal to 1000 ppm” of said elements.

Response to Arguments

6. In the response filed on January 7, 2004, applicant amended claims 21, 23-28, 32, 35, 37, 40, 42, and added new claims 45 and 46, and submitted various arguments traversing the rejections of record. Applicant's argument that the present invention is allowable over the prior art of record because each of the independent claims require a dopant selected from the amended markush group of Ac, As, B, Ba, Bi, C, Ca Cd, etc. has not been found persuasive. The examiner points out that the instant range of these elements is "less than or equal to 1000 ppm". As stated above, the prior art of record does not teach any (and therefore held to teach substantially zero) of the amended dopant markush group elements of Ac, As, B, Ba, Bi, C, Ca Cd, etc. are present in his fine grained aluminum sputtering target. Substantially zero meets the instant limitation of "less than or equal to 1000 ppm".

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

Art Unit: 1742


however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Janelle Combs-Morillo whose telephone number is (571) 272-1240. The examiner can normally be reached on 8:30 am- 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

jcm
April 1, 2004


GEORGE WYSZOMIERSKI
PRIMARY EXAMINER